

XIX.—On *Synaxes*, a new Genus of Crustacea.

By C. SPENCE BATE, F.R.S. &amp;c.

[Plate XIV.]

Genus *SYNAXES*\*.

Carapace anteriorly produced between the eyes to a flat-pointed rostrum. Eyes lodged in distinct orbits. First pair of antennæ situated beneath the second, slender, terminating in two short flagella; second situated outside and above the first pair, and terminating in a long and rigid flagellum, having the first two joints of the peduncle fused with the cephalon, and only three joints free. Pereiopoda monodactyle, first pair largest, posterior pair smallest, not chelate in the female. Branchiæ are trichobranchiate, having the podobranchial plumes attached to long mastibranchial plates (flabella). Pleopoda attached to the first somite of the pleon small and single-branched; those attached to the others are biramose, having the inner branch three-jointed and cylindrical, the outer foliaceous. The *rhipidura* (tail-fan) is broad and foliaceous, anterior portion of each plate calcareous, the posterior part membranous.

*Synaxes hybridica*.

The carapace is slightly depressed. The anterior margin is produced to a rostral point in the dorsal median line, and on the outer side of the eyes to nearly as far as the rostral point, forming a decided orbit in which the eyes are situated.

The pleon is as broad as the carapace; and small alæ on the first somite laterally protrude and overlap the posterior margin of the carapace laterally.

A slight but continuous line of elevation or carina traverses the median line of the second and three following somites, but is wanting on the first and sixth. The coxal plates are perfectly fused with their respective somites, and the *rhipidura* is foliaceous and well developed.

The eyes are small, placed on short peduncles, and distant.

The first pair of antennæ have the peduncle long and the flagella short; the second pair of antennæ have only three free joints to the peduncle, and no *scaphocerite* (or free scale), the two basal joints being closely fused with the *metopus* (or face); and the *phymacerite* (or tubercular opening to the green gland) is situated laterally, at the side of and close to the oral aperture.

\* *σύναξις*, combination.

The mandible is strong, and carries a small two-jointed *synaphipod* (or appendage).

All the pereopoda are simple, terminating in short dactyli. The first pair is the largest, and is tolerably robust; the following gradually decrease in succession until the last, which is more than proportionally smaller than the preceding. The first pair of pleopoda is small and single-branched; all the others are biramose. The four following slightly diminish in size, the inner branch being biarticulate and slender, the other being uniarticulate and foliaceous. The sixth or posterior pair, which forms the outer plates of the rhipidura (tail-fan), consists of a short basal joint and two foliaceous branches; and the telson is broad and foliaceous, having more than half its length membranous and flexible. Length about 3 inches.

*Hab.* West Indies.

The carapace is about half the length of the animal. It is subcylindrical, being dorsally slightly flattened, so that an angular ridge traverses the sides from the anterior extremity of the outer angle of the orbit to the posterior margin of the carapace. The anterior margin is projected, between the eyes to an acute angle, and outside the same organs to about half the length of the central rostral projection, between which the orbit exists as a deep and more than semicircular excavation, the limits of which are defined by a small inner and outer protuberance. The margin of the orbit is fringed with an even row of small bead-like tubercles, which at the centre is divided by a small crevice or notch. The posterior margin is dorsally excavated, being posteriorly produced at the sides and depressed especially laterally, and is edged with a fringe of short hairs, and separated from the rest of the carapace by an even line or fissure.

The carapace has the surface evenly covered with small granular projections, a prominent few of which form a longitudinal line, commencing at the anterior point of the frontal margin between the eyes and terminating near the centre of the stomachal region. Those on the dorsal surface, when closely examined, are connected on the anterior side with three or four small punctures, through which small hairs are presumed to pass, from the circumstance of their being seen to remain on the anterior and lateral portions.

The pleon is similarly punctated, but more sparingly; and all the punctures point posteriorly.

The first somite is scarcely as broad as the carapace, and has on each side a small anteriorly directed aliform process that overlaps the posterior margin and retains the carapace in its position.

The second somite dorsally underlies and laterally overlies the first somite with a small flat projecting process, at the base of the upper part of which is the articulation on which the somite moves. In the central dorsal line is a narrow elevation or ridge, which is low and smooth and repeated on the three following somites. Laterally the coxal plates are fused with the somite very perfectly; and each successive somite articulates with the preceding by a small cup-like process, which receives the extremity of a small rounded tubercle that is situated in a notch in the posterior margin of the preceding somite.

The sixth somite is smaller than the others, and dorsally smooth, and supports laterally and posteriorly an appendage with two foliaceous branches.

The telson is anteriorly calcareous, and posteriorly foliaceous.

The eyes are small, and appended to the extremity of short peduncles that are laterally connected with the ophthalmic nerve through a long narrow foramen formed by the under surface of the rostral projection impinging against the upper surface of the first and second joints of the second antennæ, which is produced so far inwards and outwards as to meet on each side in a sharp process near the median line, close under the apex of the rostral projection.

The first pair of antennæ, in consequence of the formation of the basal joint of the second pair, is forced downwards, and, when viewed in a lateral or frontal direction the first pair of antennæ, is seen beneath the second pair. It is three-jointed and slender; the first joint is long and slight, the second and third are subequal and about half the length of the first, terminating in two small flagella that are not longer than the third joint.

The second pair of antennæ has the first and second joints solidly fused with the metopus (face) or ventral surface of the cephalon, so that three joints only are free. The basal joints are so closely fused together that it is impossible to determine their limits, beyond the fact of the position of the *phymacerite*. The third joint is broad and excavated on the inner and lower side to allow space for the first pair of antennæ, which the second pair partially overrides. The fourth or penultimate joint is broad and short; and the ultimate is about the same length, and with a short obtuse spine on the outer distal angle. This last carries a stiff and strong multiarticulate flagellum, each articulus of which is fringed with small bristle-like hairs.

The mandible is robust, smooth on the incisive margin,

excepting for a single notch on one side and a corresponding tooth on the opposite, and furnished with a three-jointed *synaphipod*, the terminal joint of which is covered with numerous hairs.

The posterior oral appendages, as far as I am enabled to determine them without injury to the unique and dried specimen at my disposal, appear to approximate those of *Palinurus* in the possession of multiarticulate terminations to the outer branches.

The gnathopoda are flat and broad; the first pair has the dactylus absent, and generally resembles that of *Palinurus*. The second has the three terminal joints much narrower than the preceding, the margins of which are thickly furred with hairs.

The first pair of pereopoda is stout and strong, the meros being the widest joint of the whole; the dactylus sharp-pointed, unguiculate and slightly curved; the propodos is stout and slightly narrower at the dactyloid than at the carpal extremity. The carpus is triangular and slightly shorter than the propodos; the meros is broad and long; the ischium and basis are short, fused into one triangular joint; and the coxa is strong and short. The three succeeding pairs of pereopoda are more slender, but formed on the same type as the preceding, each successively decreasing in proportion; and the posterior pair is still smaller and more than proportionally slenderer than the others.

The first pair of pleopoda is subcentrally attached to the somite, and consists of a small, slender, unbranched appendage. The second and three following pairs are attached to the inner wall of the coxal plate and are biramose, the inner branch being two-jointed, slender, and cylindrical; the outer is single and foliaceous. The posterior pairs gradually decrease in size. The sixth pair of pleopoda is biramose and foliaceous, the anterior portion being hard and calcareous, terminating in small sharp teeth on the outer margin and central ridge, posterior to which the membranous portion is longitudinally ribbed and flexile.

The telson is broad at the base and rounded at the extremity; the anterior division is calcareous, and armed with two minute points equilaterally distant from the margins and centre, but the posterior division is membranous and flexile.

It has been to me a matter of curious interest to observe how in the history of classification every zoologist of note has, previously to the anatomy and development of the separate genera being well understood, associated the two very dissimilar looking animals of *Ibaccus* and *Palinurus* in one family.

It must have been based almost, if not absolutely, on the uniformly simple character of the pereopoda, or walking-feet, although Milne-Edwards supported it by the character of the branchial appendages; but the condition of depression that he assigns to the *Macroures cuirassés* is scarcely in accordance with the cylindrical form of *Palinurus*. But this advanced carcinologist has separated them into distinct tribes (sub-families), based on the very distinct form of their antennæ; while Leach classed them in one family, which corresponds with *Macroures cuirassés* of Edwards, except that he included the genus *Porcellana* as well as *Galathea*; while Edwards includes *Galathea* and the Eryonidæ, which latter family was not known to Leach, and only to Edwards in a fossil condition.

The union of these very distinct generic forms, in some parts so wholly unlike, clearly demonstrates that the conclusions that have been arrived at were based on a hypothetical rather than on a clear appreciation of the structure and development of the several genera.

If we take the carapace of the two forms and place them side by side, without any of the appendages attached, we shall at once see how very distinct that of *Ibaccus* and all the Scyllaridæ is from that of the Palinuridæ, even when we take them from *Arctus*, the nearest approximating genus of the two families.

In the Scyllaridæ the eyes are implanted in two distinct and perfect orbits that are almost complete in their circular circumference; and these are situated far apart, in some genera (as *Scyllarus*) as far as the limits of the carapace will admit.

In the Palinuridæ there is no orbit, and the peduncular structure, whether calcareous, as in *Palinurus*, or membranous, as in *Panulirus*, lies in front of the anterior margin of the carapace, and the eye-peduncles are connected with each other at their base.

The dorsal surface of the first antennal somite in *Ibaccus* and all the Scyllaridæ is projected in front, and locked by a pair of dovetailed processes into the anterior margin of the carapace; and the first pair of antennæ is articulated at the anterior margin of this somite.

In the Palinuridæ the first antennal somite does not appear in connexion with the anterior margin of the carapace, but is developed as a large and conspicuous structure in advance of the eyes, and at its anterior extremity the first pair of antennæ is articulated.

The second pair of antennæ resemble each other in the two separate families in their connexion with the body of the



animal. The first joints are completely fused together and with the somites to which they are attached; and there is nothing to distinguish them from the metopus or frontal surface of the anterior somites, except the presence of the phymacerate, or tubercular opening to the green gland. Three are all that are apparent as freely articulating joints belonging to the peduncle of this pair of antennæ. The terminal joint that in the Scyllaridæ exists as a broad, flat, and scale-like plate, homologizes with the long multiarticulate flagellum of the same antennæ in Palinuridæ.

The oral organs in the separate families are very distinct; but the individuality lessens in the appendages as they recede from the mouth. The gnathopoda are in several of the genera only specifically distinct. The pereiopoda or walking-legs are typically the same even to the development of a small chela at the extremity of the last pair in the females.

The carapace is bolted down by a strong tubercle attached to the sides of the last somite of the pereion (*pereiocleis*\*), both in the Palinuridæ and the Scyllaridæ; and in each there is a small aliform process that overlaps the posterior margin of the carapace (*pleocleis* †) attached to the first somite of the pleon, but which is less important in the Palinuridæ than in the Scyllaridæ. All the somites of the pleon, inclusive of the telson, are generically alike; but the pleopoda or appendages vary.

In the Palinuridæ the first pair is absent, and all the others, except that which goes to form the tail-fan, consist of a single round and foliaceous plate in the male, whereas in the female the second pair (Plate XIV. fig. 6, *q*) has two foliaceous, ovate, disk-like plates, the inner being attached to a two-jointed pedicle; the third pair (*r*) consists of an inner three-jointed biramose branch, and an outer, ovate, foliaceous plate; the two following are on the type of the third pair. In the Scyllaridæ the first is present in both male and female, and is biramose, but foliaceous in the female and styliform in the male (fig. 5, *p*). The four succeeding are biramose, one branch being cylindrical and three-jointed, the other single-jointed and foliaceous, being varied a little in both sexes; but the whole are distinguishable from those of the Palinuridæ.

The species which I have just described under the name of *Synaxes hybridica* appears to be a combination of the two families—an intermediate form that connects the two very dissimilar groups, and shows the way in which they approximate the more normal types of the Macrura.

\* κλεις, bolt, and pereion.

† κλεις, bolt, and pleon.

The eyes are those of the Scyllaridæ; the second pair of antennæ are those of the Palinuridæ. The legs are common to both forms, and the carapace belongs to neither. The frontal region resembles neither; and the posterior resembles both, as also does the pleon, whereas the pleopoda are modelled on the type of those of the Scyllaridæ, and the tail-fan is that of both.

The first thing that strikes the observation is the rostriform advancement of the frontal margin, as being very different from that of either *Scyllarus* or *Palinurus*. In *Panulirus* the frontal margin in the median line does not advance beyond that of the eyes; but in *Palinurus marinus* there is a small triangular prominence that projects above the ophthalmic somite in the median line. In *Palinurus Lalandii* this prominence is still further produced, and is so far advanced that it reaches beyond the ophthalmic somite, which it covers, and, dipping down, meets the inner portion of the ventral surface of the third somite, and so forms an imperfect orbit\*. In *Synaxes* the rostral prominence is so far advanced that it reaches to the extremity of the third or first free joint of the second pair of antennæ, beneath which the anterior and inner angle of the second joint of the second pair of antennæ is visible, and is seen to articulate with the inner and posterior angle of the next joint.

Laterally, on the outside of the orbit, the frontal margin is produced considerably in advance of the line of the organs of vision, and is longitudinally folded at an obtuse angle beneath the ventral surface. This antero-lateral development of the carapace (which I do not remember to exist anywhere so prominently, except in *Polycheles* and its generic allies) produces in the frontal margin of the carapace an orbit that is almost as deep as that of *Scyllarus*. The posterior margin of the carapace is not free as in the Astacidæ, but firmly secured in its position by an osseous tubercle (*pereiocleis*) attached to the last somite of the pereion, and lodged in a corresponding closely-fitting hollow on the underside of the carapace, so that it cannot be raised as we see that some Crustacea have the power of doing. The anterior somite of the pleon overlaps laterally, by means of small wing-like processes (*pleocleis*), the posterior margin of the carapace. This is a feature strongly pronounced in the Scyllaridæ and in *Polycheles* and its allies; it also exists to some extent in the Palinuridæ, but to a less efficient degree.

The ventral surface of the pereion in our female specimen

\* I am much inclined to think that *P. Lalandii* of Edwards must generically be separated from both *Panulirus* and *Palinurus*.

is broad and flat; and all the legs have the second and third joints fused into one—a feature common to the *Palinuridæ* and *Scyllaridæ*, but not to be found in any other form of the *Macrura*.

The last or fifth pair of pereiopoda is very much smaller than either of the preceding pairs; but it terminates in a simple dactylus, whereas in the *Scyllaridæ* and the *Palinuridæ*, and in some of the genera allied to *Polycheles*, the female has the posterior pair terminating in a minute chela—a feature that is common to the Anomurous Crustacea, but not to be found in the *Astacidæ* or *Homaridæ*, and separates them from those that possess this character.

In *Synaxes* the pleon has a longitudinal central ridge or line of elevation—a feature common to many of the *Scyllaridæ*, but seldom seen in the *Palinuridæ*, although lines of demarcation without elevation are apparent in the *Palinurus marinus* of our seas. It becomes a prominent feature in the *Eryonidæ*, but is never seen in the *Astacidæ* or *Homaridæ*.

The pleopoda are developed very similarly to those which exist in the *Scyllaridæ*, and are distinguishable from those of any other form among the *Macrura*, especially in the female, where one, the inner (or true representative of the leg), is three-jointed and cylindrical, and the outer is a simple foliaceous plate. In the *Palinuridæ* in the male there is only the outer leaf-like plate, the inner ramus being absent. In the females the second pair consists of two foliaceous plates, the third and following of one foliaceous plate and a subcylindrical biramose branch. The appendage which belongs to the anterior somite is well developed in the *Scyllaridæ*, is reduced to a small cylindrical rod in *Synaxes*, and is absent in the *Palinuridæ*.

The position among the *Macrura* that the present species occupies is very near to *Palinurus*; and its departure appears to approximate more or less closely the genera that go to make up the family of the *Scyllaridæ*. The first distinguishing feature is the advanced rostriform projection between the eyes, of which we have no representative in either of the known families, although in some species a small incipient process appears to exist, as in *Palinurus marinus*. But this feature in *Synaxes* brings the form of the carapace into close resemblance with that of the *Astacidea*, from which it may be distinguished by its being secured at the posterior margin. The breadth of the ventral surface of the pereion, the form of the pereiopoda and antennæ are all peculiar to the *Palinuridæ*, whereas those of the pereiopoda and the pleopoda are essentially features of the *Scyllaridæ*. It would thus appear that the



specimen assumes a hybrid appearance. All the anterior appendages except the eyes are those of *Palinurus*; the eyes and the posterior appendages are those of *Scyllarus*, while the intermediate appendages are common to both. It does not belong to any genus of the Palinuridæ; and it does not belong to any in Scyllaridæ: it either unites the two outlying families into one, or it is the type of a form distinct from either. My own inclination is to bring the three into one family; but our want of knowledge of the character of the brephalus of *Synaxes*, whether it be that of *Phyllosoma*, as are those of the other two forms, in each of which are several very distinct and well-defined genera, makes it more prudent for the present to group it in a distinct subfamily in the same tribe as the other two, thus:—

#### SYNTAXIDEA.

##### Synaxidæ.

*Scyllarina.*

*Synaxina.*

*Palinurina.*

The dried condition of the specimen at my disposal has enabled me only slightly to examine the branchial apparatus; but from what I have seen I think it may be tabulated by the same formula as that of *Palinurus* and *Scyllarus*.

The specimen has been kindly lent to me for examination by Dr. Carte, and belongs to the Natural-History Museum under his care in Dublin. It was taken in the West Indies by Commodore Sir F. M'Clintock; but the depth and precise locality are not recorded.

#### EXPLANATION OF PLATE XIV.

Fig. 1. *Synaxes hybridica*. Dorsal aspect.

Fig. 2. *S. hybridica*. Ventral aspect.

Fig. 3. *S. hybridica*. Lateral aspect of cephalon (eye removed).

Fig. 4. *q*, second pair of pleopoda (*Synaxes*, female).

Fig. 5. *p*, first pair of pleopoda (*Arctus*, male); *q*, second pair of pleopoda (*Arctus*, female); *r*, third pair of pleopoda (*Arctus*, female).

Fig. 6. *q*, second pair of pleopoda (*Palinurus*, female); *r*, third pair of pleopoda (*Palinurus*, female).

XX.—On the first Part of a Memoir by Mons. Charles Oberthür on the Lepidoptera of the Isle of Askold. By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

IN the last livraison of his 'Etudes d'Entomologie' (some preliminary diagnoses for which were kindly forwarded to me by the author late in 1880) M. Oberthür gives an account of